future missions to Mars, both robotic and "folked." The pingo ice core could contain relatively pure water ice within several meters of the surface.

The massif inselbergs are not as numerous nor as massive as those in fretted terrains to the northwest, so local slopes are not expected to be steep. Neither feature should pose a serious threat to the lander. Landing on or adjacent to one of these features would enhance the science return and would help to pinpoint the landing site in Viking and subsequent orbiter images by offering views of landmarks beyond the local horizon.

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CERBERUS PLAINS: A MOST EXCELLENT PATHFINDER LANDING SITE. J. B. Plescia, Jet Propulsion Laboratory, California Institute of Technology, Pasadena CA 91109, USA.

Introduction: The Cerberus Plains in southeastern Elysium and western Amazonis cover $>10^5$ km^2, extending an east-west distance of ~3000 km and a north-south distance of up to 700 km near 195°. Crater numbers are 89 ± 15 craters >1 km/10^6 km^2, similar to values obtained by [2,3], indicating a stratigraphic age of Upper Amazonian and an absolute age of 200–500 Ma [1]. The material forming the surface is referred to as the Cerberus Formation. The unit's origin is controversial; two ideas have been postulated, fluvial [4,1] and volcanic [5]. Regardless of which interpretation is correct, the Cerberus Plains is an important candidate for a Pathfinder landing site because it represents the youngest major geologic event (be it fluvial or volcanic) on Mars.

Geology: The unit exhibits lobate albedo patterns and embayment relations with older terrane. These patterns suggest flow eastward across Cerberus, then northeastward through the knobby terrane into Amazonis (exploiting a series of older channels carved into knobby terrane and ridged plains). Albedo patterns in the east are regionally organized into bands up to 40 km wide; in the west, albedo patterns are complex and intricate with digitate boundaries. Small-scale surface texture is variable. Near 19°N, 174°W, where the unit fills a channel, the floor appears smooth, whereas the surrounding terrane has significant texture. The southern margin exhibits pressure ridges, flow fronts, and flowage around obstacles.

The morphology of the Cerberus Plains is interpreted to indicate that it is an example of flood-basalt volcanism (e.g., Deccan Traps, Columbia Plateau); the morphology of the western part indicates plains-style volcanism (e.g., Snake River Plains). Terrestrial flood basalt provinces [6,7] are characterized by flows 5–45 m thick extending over large areas having little relief. Eruption rates are very high with fissure vents tens to hundreds of kilometers long in zones several kilometers wide. Six low shields have been identified in the western plains. Some of the Cerberus shields are elongate, having elliptical vents; others are more symmetric.

Pathfinder Mission Implications: The Cerberus Formation occurs between longitudes 165° and 220° and latitudes 5°S and 30°N, although the material does not completely cover this area. The largest expanse occurs at 180°–210°W and 5°S–10°N. Thus, the area of exposure is within the Pathfinder constraints (0°–30°N). Elevations [8] are at altitudes <–1 km; a northeast-trending band from 5°N, 197°W toward 10°N, 180°W has elevations <–2 km. These altitudes are within the Pathfinder range (<0 km). A 100-km × 200-km ellipse along a N74°E trend is easily found within the unit; a target for the center of the landing ellipse is 6°N, 183°W, a location ensuring landing within in the unit. The Cerberus region has low thermal inertia [9] ($<4 \times 10^{-3}$ cal cm^{-2} s$^{-1/2}$ K^{-1}), interpreted to indicate a low rock fraction exposed at the surface [10], <10%. This suggests the area would be relatively safe for landing, but still offers the potential for finding exposed rock.

Possible Scientific Implications: The first question to be resolved is whether the Cerberus Formation is of volcanic or fluvial origin. This alternative is testable with both imaging and elemental data. A volcanic flood basalt terrain should show a level, possibly slightly rolling surface; flow fronts and pressure ridges may be present. Rock analysis, both spectral and elemental, should show a relatively uniform composition. A fluvial environment should show channels and a scoured surface, and evidence of erosion should be abundant at all scales. Since debris on the surface would be from many sources, significant heterogeneity would be expected in the spectral and elemental analysis of the rocks.

It can be postulated that the Cerberus Plains are the source for some of the SNC meteorites, specifically shergottites, on the basis of age and volcanic style. Shergotty, Zagami, ALHA 77005, and EETA 79001 have ages of 160–180 Ma [11,12]. Only the Cerberus Formation is of sufficient size and age to be a statistically significant source region. Major-element chemistry for the shergottites is SiO_2 at 43–51%, FeO at 18–20%, Al_2O_3 at 3–9%, MgO at 9–28%, and CaO at 3–11%. The apx unit will provide key elemental data at the percent level. Shergottites are dominated by pigeonite (~26–40%), augite (11–37%), and plagioclase-maskelynite (10–29%). The presence of these minerals may be detectable by the filters in the imaging system, depending on the choice of band passes. These two instruments should provide sufficient data to determine whether the Cerberus Formation is the unit from which the shergottites were derived.

The interpretation that Cerberus Plains results from flood volcanism late in martian history carries implications for martian thermal history. Although central vent volcanism has been recognized as occurring late, flood volcanism has not. Flood volcanism in the period <700 Ma indicates that, at least in the Elysium region, sufficient heat remained to generate large volumes of low viscosity lavas.

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